LAKE KARIBA FISHERIES RESEARCH INSTITUTE

1994 ANNUAL REPORT

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Lake Kariba Fisheries Research Institute
BOX 75
Kariba

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TABLE OF CONTENTS

ACTING OFFICER IN CHARGE'S REPORT

1. Institute Finances

The funds granted to the institute in 1994 stood at $1,200,000.00 representing an increase 20% compared to $1,000,000.00 for 1993. The station had bid for $1,816,000.00. A large part of the institute operations was therefore financed through the Zambia/Zimbabwe SADC Fisheries Project (ZZSFP). This included most of the maintenance of equipment and vehicles which the Government is supposed to cater for under the project agreement. This need for maintenance of equipment and vehicles was highlighted in the mid-term Project Review of September 1993 as the only way towards the long term sustainability of the project and should therefore be given top priority as far as funding by Government is concerned. Phase One of the Zambia/Zimbabwe SADC Fisheries Project has been extended to 1996 and by that time Government funding should be in place to take care of all the activities currently undertaken under the Zambia/Zimbabwe SADC Fisheries project. Otherwise the institute will have to cut back on a lot of its activities to come down to the level of funding no matter how undesirable this might be.

2. Staffing and Staff Training

Senior Staff:

The end of 1994 represents one of the worst periods in the recent history of the Institute through the resignation of two of some of its most senior and most experienced staff. Ecologist Chifamba and Sanyanga left the Institute for greener pasturers with the University of Zimbabwe following years of unsuccessfully trying to improve their working conditions within civil service. This represents a great drawback to the Institute in that to replace them will require another lengthy and costly training process which could have been avoided if only conditions in civil service had not continued to be so frustrating. Both ecologists played a major role in the Zambia/Zimbabwe SADC Fisheries Project and their participation will be greatly missed. We wish them more rewarding experiences where they have gone. Also to leave at this crucial time was Mr. Nyaude who had served both the project and the fund with a lot of dedication in the accounts office. We wish him a more fruitful and rewarding experience on his new job.

As far as senior staff training is concerned the following took place:

a) Ecologist Chifamba and Mhlanga participated in the 4th International course on Data Handling for Tropical Fisheries Management at Wageningen, in The Netherlands in January to mid February 1994.

b) Ecologist Mtsambiwa submitted his Ph.D thesis to the University of British Columbia in Canada and hopes to defend it in the first half of 1995.

c) Ranger Mwera continued to receive on the job training in workshop

maintenance from Hannes Bjarnason.

Junior Staff

It was also bad year as far as junior staff outlook was concerned. The Institute lost three experienced coxswains, C. Ndaza, J. Chironga and S. Siakalonga to both the Private Sector and the University of Zimbabwe. The Institute also lost two experienced general hands through (a) the untimely death of C. Nosha who had been in the workshop for 12 years. May his soul rest in peace. b) Mr. I. Gunduza who joined the private sector. For those who took up appointments elsewhere, we wish them a rewarding experience as well. Mr. M. Chitsere transferred from Head office to fill in one of the vacant posts and was assigned to the workshop.

3. Staff Housing

The problem with housing remained critical over the year. Following the sharing of properties between Zambezi River Authority and ZESA two senior staff houses fell under ZESA and new lease agreements were signed. These are 4 Libuyu and 19 Syringa which were offered to the Institute up to June 1995. ZRA intended to terminate the lease of 8 Mukwa close without any further negotiations by 31 December 1994. It repossessed 12 Libuyu fortunately just at the time the construction of two houses at Nyamhunga was completed. Ecologist Songore and Ranger Mwera moved into these two houses.

Plans are underway to build senior staff houses on a piece of land behind the Institute which was obtained by national Parks though a land exchange programme with Kariba Town Council, initially two houses are proposed and more will be built, as and when funds are available. It is hoped that this will solve our housing problem and save us the embarrassment of being constantly threatened by ZRA.

Junior staff housing was also problematic in that all retired, resigned or deceased junior staff took with them the houses they occupied. This follows the change of policy by the Kariba Town Council that all tied houses in both Nyamhunga and Mahombekombe could now be leased directly by the tenants from the council with effect from 1 October, 1993. Thus attempts to provide staff for in coming junior staff proved extremely difficult making it absolutely necessary for this Institute to build houses for junior staff as well in the near future.

4. Infrastructure and Institute Expansion

The construction of office/laboratory block at Binga commenced in earnest in the last quarter of 1994. Building materials for the two staff houses in Binga were also on order and that construction shall commerce upon completion of the office/laboratory block.

The construction of the Camphill guest house continued to meet all kinds of technical problems. The Institute was only able to hire a bulldozer to level part of the stand where the house will be built but that was all. Negotiations with the Ministry of Public construction and National Housing continued to resolve this problem. So far all these delays have been matched by an escalation in the costs of construction which was unfortunate indeed.

Extension of the workshop commenced and a lot of progress was made. This part of the workshop will be fitted with a maintenance pit and the one next to the laboratory block will be filled up.

There was no progress in the construction of the new Institute.

5. Vehicles and Vessels

Vehicles

The Toyota Landscruiser Registration No. 520-089N which had been involved in two consecutive accidents in the previous years was finally delivered to the Institute. However, its condition at delivery was far from satisfactory such that it could not be used extensively for project activities. The landrover 109 which had been recommended for auctioning by a Board of survey in 1993 was loaned to the management due to their severe shortage of transport.

All the other vehicles were running although with the usual problems which were repaired in most cases. The Institute was able to carry out regional projects mostly through the use of the 60TCE25 which proved most reliable of the fleet.

Vessels

Generally all vessels operated well during 1994 except for the general small breakdowns. No major jobs were carried out on any of them. In some cases when necessary certain parts were interchanged to enable preferred vessels to be used if for some reason such vessels were not working properly due to the particular spare parts.

6. Fisheries Management

Inshore Fishery Management

Inshore fishery Management experienced the enhancement of the CAMPFIRE approach through the creation of Fishing Camps Management Committees. Ecologist Kwaramba, based at Sebakwe and Ranger S. Nzunga with the assistance of Dr. Machena and Ecologist Songore played a major role in the promotion of the CAMPFIRE approach to the gill-net fishery. Several meetings and training courses were conducted by this team with additional assistance from Agritex.

Sardine Fishery Management

The year 1994 saw the promotion of the formation of a single kapenta producers association through holding meetings with non-members encouraging them to join the association on one hand. On the other hand the kapenta producers association was also invited to adopt strategies that would encourage non members to join the organization.

Anti-poaching Operations

The anti-poaching unit set up in 1993 continued to carry-out its work during 1994. A number of successful operations led to the apprehension and imposition of deposit fines on offenders.

A number of Kapenta fishing vessels were issued with deposit fines for fishing in Leisure Bay. Due to the increased number of these incidences a circular reminding all operators of the regulations in force was sent out. This circular also contained proposed punitive measures that would be taken on offenders depending on whether they were first, second or third offenders.

The Kapenta Producer's Association applied through LKFRI to donors for the funding of a single security boat that would patrol the lake during the night. This application was unsuccessful on the ground that donors felt KPA membership could afford this venture on their own if they so wished without outside funding.

M.Z. Mtsambiwa

Project title

PRE-RECRUITMENT ECOLOGY OF THE FRESHWATER SARDINE *LIMNOTHRISSA MIODON* IN LAKE KARIBA (ZIMBABWE).

Project Objectives

a) To investigate the factors influencing recruitment variability of the freshwater sardine *Limnothrissa miodon* in Lake Kariba.

b) To incorporate the knowledge gained in the study into the sardine fishery management strategies.

Work Accomplished

Work concentrated on the write up of the Ph D thesis for submission in partial fulfilment of the requirements for that degree with the University of British Columbia in Canada. The first draft of the thesis was submitted to the supervisory committee in October 1994 for their comments. The title of the thesis is now as follows:

"Some management aspects of the recruitment ecology of the freshwater sardine *Limnothrissa miodon* in Lake Kariba."

Some of the highlights of the thesis include the results of three short field experiments which are as follows:

i) Working out of the selectivity curve

This was done to evaluate the current minimum mesh size in use in the sardine fishery. To achieve this fishing was carried out from an experimental vessel with a commercial net lined inside with mosquito gauze fishing next to an ordinary commercial rig. Fishing was conducted at different depths from the inshore to offshore in the Leisure Bay of Lake Kariba. Samples taken from the two vessels were compared and only those from 10-15 m were used to obtain the selectivity curve . The rest of the samples from the other depths could not be used as they comprised of fish of the same size in almost equal numbers in both vessels. The minimum mesh size of 8 mm was found to generate a length at first capture of 22 mm by which size the fish are still in the late juvenile stages. The implications are that using this mesh size at depths greater than 15 m is most appropriate as it would target only the adult stages. Thus the enforcement of the regulation limiting fishing to only those areas deeper than 15 m is of paramount importance to the fishery to avoid growth overfishing.

ii) Validation of spatial distribution of larval kapenta

This was done mainly to investigate the range of the inshore utilised as nursery ground by larval kapenta. To achieve this sampling was done randomly along the entire shoreline from Kariba to Mlibizi. Larval kapenta were captured in all areas sampled irrespective of substrate or slope. This showed that kapenta utilizes a wide range of habitats within the inshore as nursery grounds but certain habitats seemed to be more preferred than others. It was however not possible to sample where there are submerged trees as the gear in use was not appropriate for those types of habitats.

iii) Validation of temporal distribution

This was done to investigate whether kapenta was present at the same place for a given time. Sampling was carried out at one station every other night for a month. Larval kapenta were captured every sampling night at that same spot indicating that they were continuously recruiting from somewhere.

Work to Be Done

One of the major areas which have not been accomplished in this study is the establishment of where the eggs are laid and where the yolk sac larvae occur. As a result it has not been possible to establish whether recruitment variability is determined at the egg or yolk sac larval stage. From the study, variability is already observed at the larval stage as can be seen from the variability in capture of larvae from month to month.

One of the reasons proposed for the failure to capture both the eggs and the yolk sac larvae is that the gear in use does not target these stages. For yolk sac larvae two reasons are further proposed i.e. that they have not yet developed response to light stimuli as older larvae or that if they have yolk sac is too heavy for them to swim towards light such that they are not captured. Thus one of the crucial areas of future work is to design gear that would capture those stages that are not being captured by the gear in use at the moment.

Another area of importance in future work is to look at possible ways of estimating larval abundances. Attempts to use hydro acoustic means using a 200 kHz echo sounder were largely a failure in the current study and future work should aim at improving ways of estimating these abundances. Future work should also look at the possibility of estimating abundances in areas with submerged trees.

More work needs to be done to unequivocally prove that rings in the otoliths of larval kapenta are laid on a daily basis. These were used to estimate the age of fish and very few samples were used in supporting the hypothesis that rings are laid on daily basis, hence the need to do more validation exercises so as to prove beyond doubt that rings in the otoliths of larval kapenta are laid on a daily basis.

W. Mhlanga

Project I

HYDROACOUSTIC SURVEYS OF KAPENTA (*LIMNOTHRISSA MIODON*) ABUNDANCE ON LAKE KARIBA

Project Objectives

The major aim of this project is to estimate the biomass of Kapenta in the lake. This information is vital in the assessment of fish stocks. Fish Stock Assessment is a major component in Fisheries Management. This data will be used in making decisions on the levels of exploitation which are both optimal and sustainable.

Work accomplished

The surveys which are carried out jointly by Zambian and Zimbabwean researchers, continued in 1994. Quarterly surveys were planned for the whole year. However, only three surveys (January, June and July) were carried out due to boat breakdowns. Mr N. Songore (Zimbabwe) conducted the January survey, together with Mr P. Ngalande (Zambia). The author carried out the survey in June, and participated in the July survey with Mr P. Ngalande. A total of 3 surveys covering the whole lake were conducted in 1994. A total of 12 transects were covered during each survey.

The mean fish densities for the whole lake varied from 27 000 fish per hectare (fish/ha) in July 1994 to 34 000 fish/ha in June 1994. These densities are approximately equal to 19 kg/ha and 32 kg/ha, respectively. The results show that density estimates vary significantly between months. The observed values were lower than the 37 kg/ha observed in January 1992.

The results also showed that in different months, different areas had the highest densities. The Binga/Mlibizi area generally had higher densities, while low densities occurred in the Sanyati Basin. The low fish densities observed in the Sanyati Basin is probably due to the high fishing pressure in this Basin.

Work to be done

Quarterly surveys are to be conducted in 1995. Based on the data available, the current sampling program will be reviewed and changes will be made where necessary. Studies will also be carried out to establish whether variations in fish density are related to fishing intensity (fishing effort). Sampling of kapenta from the commercial catch will continue.

A project report will be compiled by July 1995.

Project II

HYDROACOUSTIC SURVEYS OF KAPENTA (*LIMNOTHRISSA MIODON*) ABUNDANCE ON LAKE CAHORA BASSA, MOZAMBIQUE

Background

The Kapenta in Lake Cahora Bassa originated from Lake Kariba. Commercial fishing on Lake Cahora Bassa began in 1994, with less than 5 fishing vessels. The number of fishing vessels continues to increase. It can be observed that the fishery on this lake provides a unique opportunity to monitor the transition of a pelagic fishery from an unexploited (virgin) state to an exploited state.

As commercial fishing expands, the need to manage the resource in a sustainable manner will become increasingly important. Thus, the data which are being collected now will be invaluable in future management of the fishery.

The study is being conducted in collaboration with Mozambican Fisheries Officers. The surveys on Cahora Bassa and Kariba are undertaken within two weeks of each other. This allows for direct comparisons to made between the two fisheries.

The project is also proving to be useful as it is strengthening the regional cooperation in fisheries research in general, and Kapenta research in particular.

Project objectives

The main objective of the study is to determine the abundance of Kapenta. This information will be used in Kapenta Fish Stock Assessment on Cahora Bassa.

The project is also aimed at enhancing collaboration in the field of fisheries research, particularly in the use of hydroacoustics to assess the abundance of Kapenta.

Work accomplished

Researchers from the Zambia/Zimbabwe SADC Fisheries Project (ZZSFP) and IIP (Instituto de Investgação Pesqueira), the Fisheries Research Institute in Mozambique conducted two joint hydroacoustic surveys on Cahora Bassa in February and July 1994. The researchers who participated in the February survey were Mr. N. Songore (Zimbabwe), Mr P. Ngalande (Zambia), Ms. A. P. Baloi (Mozambique). In the July survey, participants were Mr A. Pegado (Mozambique), Mr N. Songore (Zimbabwe), Mr P. Ngalande (Zambia) and Mr W. Mhlanga (Zimbabwe).

A draft report on these surveys has been prepared and will be released soon (see publications list).

Work to be done

Quarterly surveys will be carried out in 1995. Kapenta samples from the commercial fishery will be collected on a regular basis.

Project III

ANALYSIS OF ANGLERS' CATCHES FROM THE TIGERFISH TOURNAMENT

Project objectives

The aim of this project is to create a computerized database of the Catch records from this annual sport fishing tournament. This database will then be useful in monitoring the changes (trends) in the fishery. A report will be prepared once all the data have been compiled.

Work Accomplished

Data for the period 1992 to 1995 have been entered into the database. Preliminary results indicate that there has been a drop in the catches, especially in the last 2 years. The program has been delayed due to staff resignations in the last year which have resulted in manpower shortages. As the data have to be checked for errors, the report that was supposed to be ready by December 1994 has been delayed.

Work to be done

Data entry will continue, though at a much slower pace. The data will be checked regularly, and a draft report should be ready by December 1995.

Project IV
DATA COLLECTION FROM NON-TOURNAMENT ANGLERS

Project objectives

The project is aimed at estimating the quantities of fish that are caught by the sport-fishermen. This data will be useful in comparing the catches of the sport (rod and line) fishermen with those of the commercial (gillnet) fishermen.

Work Accomplished

The program was started in early 1994. Initially, questionnaires were placed at one pilot site where anglers moor their boats. As very few anglers were filling in the forms, it was decided that staff from the Institute would regularly visit the mooring site and collect the data.

Due to manpower constraints this program has been postponed indefinitely.

Project V
TIGERFISH STUDIES

Background

In October 1993, a Workshop was held. The aim of this workshop was to analyze the data on the inshore fishery on both the Zambian and Zimbabwean shoreline of Lake Kariba. A report was later produced. The report noted that estimates of Tigerfish growth and mortality needed to be refined. In a later report (mid-term review of the Zambia/Zimbabwe SADC Fisheries Project), it was also observed that there was need to assess the possible impact of Kapenta abundance on Tigerfish stocks. Thus a project focusing on Tigerfish studies was started in early 1994. The project will be carried out in phases.

Project objectives

The aims of the current project are:
(a) to make a quantitative assessment of Tigerfish predation on Kapenta and;
(b) to determine gillnet selectivity in Tigerfish.

Work Accomplished

Field sampling was conducted in different areas during the last year.

Work to be done

Gillnet sampling will continue in 1995. Preliminary data analysis will be carried out during December 1995.

Project VI

PRELIMINARY ASSESSMENT OF WATER QUALITY IN FISH CAGES

Project objectives

The objective of this study was to assess water quality in fish cages on the lake.

Work Accomplished

Preliminary assessment of water quality in fish cages was completed in 1994 and a report was compiled (see publications list). The areas requiring further studies were highlighted.

OTHER ACTIVITIES

SYMPOSIA / SEMINARS ATTENDED

In December, the author attended a seminar in Harare on African Inland Fisheries, Aquaculture and the Environment which was held in conjunction with the Ninth Session of CIFA (Committee for Inland Fisheries of Africa).

INSHORE WORKING GROUP

The inaugural meeting of the Inshore Working Group was held in Sinazongwe on the 7th of March 1994. Participants included researchers from Lake Kariba Fisheries Research Institute (Zimbabwe), Sinazongwe Fisheries Training Centre (Zambia) and CASS Research Fellows who are involved in studies involving the Inshore fishery on Lake Kariba. The group identified the priority areas for research (under the Zambia/Zimbabwe SADC Fisheries Project) and the researchers who are to carry out these studies.

R.A. Sanyanga

UPDATE ON CATCH EFFORT DATA RECORDING SYSTEM (CEDRS)

The programme has continued without any major problems. The implementation of collection of length frequencies during enumeration was not implemented as planned. The delay has been due to late arrival of scales. The scales are essential for measuring individual fish as the old ones have wide graduations which would result errors.

This delay will in turn affect the proposed inshore workshop in October 1995 because at least one year's data are required for analysis. With data for a year an evaluation of the CEDRS method can be made.

Logistic problems occurred in deployment of enumerators. Vessel breakdowns were very frequent to the extend that activities had to be curtailed. Collections and deployments were always running late causing a lot of disruptions and extra subsistence had to be paid out.

Further problems have occurred towards the end of 1994. Due to resignations of a number of staff the enumeration programme has had to run with only six men. This has led to a number of villages being skipped. An evaluation needs to be done to see whether this does not affect the overall results. Otherwise the alternative is to train fishermen to give returns.

STATUS OF DATABASE (including collaboration with Zambia & CASS)

Most of the old data have been entered. It is possible for the scouts to enter all the incoming data without the institute relying on data capturers. Senior scouts could be used for that. All Kapenta data are up-to-date. Lakeside data are entered upon arrival. Enumerated data are the one lagging behind. One of the enumerators has to be assigned to do that.

The assistant database manager has been supervising the data entry continuously. More and more companies are submitting returns several months late. This has caused delays in production of reports. The reminders should be sent soon after end of each month. An evaluation is also required on the reliability of the Kapenta data as there are several new companies and a general lax by the old companies.

The implementation of a new database program has not been done due to unavailability of time. Zambia has taken the lead but are only running Foxpro on a trial basis. Zimbabwe has decided to wait for results from Zambia instead of duplicating the activity.

A new library database software has been purchased and its being tried. It should be functional by end of January 1995.

It is recommended that a database manager should have a basic fisheries training for better implementation and interpretation of results.

The Institute still awaits the CASS database so that is can be incorporated with the rest of the database.

TRAINING AND SYMPOSIA ATTENDED OR GIVEN

The CIFA conference was attended in December 1994. The theme was on pollution so the author did not present any paper. The author was invited to attended a Wetlands Management conference for Botswana in Kasane in November 1995. Three months (May, June & July) were spent in Sweden for supervisory purposes.

A symposium entitled "Preliminary results on the investigation of the Inshore Fishery of Lake Kariba" was given to Kariba audience at the beginning of September 1994.

SUMMARY OF TRENDS IN INSHORE AND KAPENTA FISHERY EFFORT, CATCH AND CPUE OVER THE LAST 5 YEARS

It has been noted that trends in catches are very similar in both countries. Inshore catches on both sides began to increase after the Zimbabwe liberation war. In this fishery the increases and decrease do occur simultaneously. The decline in catches are strongly correlated to low rainfall in the catchment area. The 1985 drought which affected Zimbabwe more than Zambia resulted in a drop in catches. The same occurred in 1990 and 1992. The peak in catches for the decade were in 1977 and 1978. The species composition differ slightly as in Zambia there is more occurrence of smaller species *Synodontis zambezensis, Schilbe intermedius* and *Brycinus imberi.*

SUMMARY OF RESEARCH ACTIVITIES AND RESULTS

Some aspects of the ecology of the freshwater catfish *Synodontis zambezensis* (pisces: Mochocidae) were studied using Lundgren monofilament nets.

Results

a) Species composition and relative abundance using % IRI

Table 1. Distribution by Depth using % IRI

0-3m	3-6m	6-12m	12-20m
B. lateralis	*S. zambezensis*	*S. zambezensis*	*S. zambezensis*
S. zambezensis	*B. lateralis*	*B. uniteniatus*	*L. miodon*
S. codringtonii	*B. uniteniatus*	*P. philander*	*B. uniteniatus*

B. imberi	*H. vittatus*	*B. lateralis*	*P. philander*
B. uniteniatus	*P. philander*	*L. miodon*	*H. vittatus*
H. vittatus	*S. condringtonii*	*H. vittatus*	*H. discorhyncus*
S. intermedius	*B. imberi*	*S. intermedius*	*S. intermedius*
P. philander	*S. intermedius*	*H. discorhyncus*	
20 species	21 species	21 species	16 species

The abundance of *Synodontis zambezensis* in terms of CPUE increases with depth as that of other inshore fish decrease.

b) Size and distribution

The abundance is highest in March and April but showing a peak in April which coincide with breeding season. The fecundity based on egg count is between 35,000 and 100,000 for adult fish. During that period the fish are most abundant in the shallower depth zones.

The *Synodontis* males were found to be much smaller than their females and that the two sexes had significantly different means and modes hence causing a bimodal distribution. The females make 57,65% of the population composition at all times except during breeding time. The largest fish were found to occur at shallower depth and the smaller fish were at 20m. The size was inversely proportional to depth increase and to CPUE. A hydrological effect was observed. Smaller fish were found near the riverine basin and the fish increased in mean length as one moves towards the lacustrine basin. The size distribution at different station was not related to abundance. The length-weight relationship for *S. zambezensis* can be described as:

$$W = 0.008 * L(\text{exp } 3.06) \qquad r^2 = 97\%$$

c) Food

The fish is omnivorous and generally browses on benthic deposits. All types of food ranging from plankton, benthos, fish to plant remains were found in the stomach contents of *S. zambezensis*. Food type seemed to depend on the area and a depth sampled. Further analysis is being done on stomach contents.

d) Selectivity and growth parameters

Fish were caught in all mesh sizes however selection occurred between mesh 33 and 86 mm. Catches in the smaller meshes were mostly due to entanglement. The selection curves obtained were negatively skewed and bi-modal.

L-infinity	females = 37	males = 36
K	females = 0.4	males = 0.30

Exploitation levels of were shown to be very low.

P. C. Chifamba

Project 1

AN ASSESSMENT OF THE IMPORTANCE OF BY-CATCH IN THE KAPENTA FISHERY.

Objectives

The aim of the project was to quantify the by-catch and to determine the species composition of the by-catch. The results were expected to demonstrate the level of impact the kapenta fishery has on non-target fish. The notion was that it was possible that although the percentage of these other fish in the catch was small the actual numbers caught could be large owing to large kapenta catch. In addition, the quantification of the by-catch would provide information for use in ecosystem models.

Work Accomplished

The programme was started mid 1993 and was continued in 1994 in order to collect at least a complete years data. Samples were collected from some co-operating fishing companies fishing throughout the lake. A form was designed to include the collection of breams, alestes, sqeakers and silver barbel which were not previously recorded. These species have very few individuals in the kapenta catch so were difficult to separate. Except for those companies who normally separate these species the programme increases work load of the company. In view of this difficulty the programme is meant to run for a year.

In order to determine the species classified as breams a sample was collected from the Kariba area. Most of the breams were found to be *Pharyngochromis darlingi* a species not caught in the gill-net fishery. A small proportion other breams utilized in the gill-net fishery are also caught. The numbers caught are generally so small that the fishery is not likely to be affected.

The by-catch constitute a very small proportion of the catch, making up about 2.5 % of the catch. Although the proportion in the catch is small because of the small size of fish in the catch the numbers actually caught is large. The amount of in the catch can also be large considering the total catch of kapenta which is in the region of 20 000 tonnes annually (Zimbabwe side only). The total catch could amount to almost 10% of the total inshore fishery catch.

The type of fish vary for different parts of the lake with more butter catfish and sqeakers caught in the more riverine Binga area than Kariba area.

Project II
Determine presence of *Oreochromis niloticus* in Lake Kariba

Objectives

1. To determine if there are any *O. niloticus*
2. Check whether the population is established
3 Determine interaction with *Oreochromis mortimeri* on food competition

Work Accomplished

This project was carried over from 1993 when samples of fish were taken from 6 sites in the Sanyati Basin in August and September. These were selected on the basis of proximity to possible introduction. Areas regarded as likely places were adjacent to current and past fish farms. Two types of gears, gill-nets and a purse seine were used. Five nets with mesh sizes ranging from 38 mm mesh size to 178 mm each mesh size with a length of 45.5 m were used. These were similar to the nets used in the experimental weekly sampling programme carried out at the Lakeside sampling station. The areas where the purse seine could be used were very restricted because of the need to identify suitable shoreline for hauling in the net, whilst also avoiding submerged tree stumps, excessive weed.

The number of *O niloticus* caught was a small proportion of the total catch of breams. The specimen caught ranged from 16 to 20 cm standard length. Some fish could be identified confidently others appeared to be hybrids. There are two possible explanation for the presence of hybrids. Either these were introduced as hybrids from the fish farm or they have hybridized with other fish in the lake. The fish are known to hybridize easily with other breams. Such a conclusion would only be possible if representative of the whole spectrum of the population were caught.

Stomach contents were taken from the species identified as *O. niloticus* and compared to the *O. mortimeri*. The stomach contents were similar confirming what is reported in literature that there is likely to be competition for food between the two species.

During the course of the year the presence of *O .niloticus* in the regular gill-netting programme were monitored. The number of the fish in the catch was small and throughout the year more than 60 fish ranging in size from 14.2 cm to 30 cm were caught. Both sexes were represented. Some of these were mature and had eggs or milt implying that the fish are breeding in the lake.

The programme confirmed the presence of *O. niloticus* in Lake Kariba. This finding has implication on the policy of banning the use of the fish in the fish farms on the shores of Lake Kariba. Since the fish is likely to spread through the lake there in no gain from prohibiting the farming of this fish adjacent to the lake. This unplanned introduction could be used as experience in preventing introduction of exotic species in the country's water bodies.

A draft report was written and will be finalize as soon as comments are made available.

Work to be done

Monitoring spread of species
Competition with other species

OTHER PROGRAMMES

Periodicity of deposition of rings on otoliths

Same progress was made in the analysis of otolith used for determining the periodicity of deposition of band which we assume to be daily rings. More samples of kapenta otolith from the batch kept at the University were analyzed. A pattern on the periodicity of the deposition of the bands has began to emerge although results are still too preliminary to be conclusive. The edge of otoliths are examined under the electron microscope to determine the type and size of the band on the edge. Samples cover a 24 hour period and only those between 4 and 18 00 hours have been analyses and it appears that a light band is deposited over a short period.

The collection of the by-catch data was carried out throughout the reporting period. By the end of this month a whole year of data would be collected. The data are currently being processed.

Kapenta length- frequency monitoring

Samples of kapenta for the on going length-frequency monitoring programme were collected from the fishing companies operating in the Sanyati basis and the length and weight recorded. Most of the data have been analysed for the report. There is significant temporal and spatial variation of size of fish and condition. Annual variation could be linked to lake levels and spatial to variation in plankton abundance throughout the lake. The annual variation in fish condition are linked to the catch size.

Training

I attended a course on Data Handling for Tropical and Fisheries Management from 9 January to 19 February in Wageningen, the Netherlands. After the course, I made a 3 day contact visit to University of Aberdeen. The purpose of the visit was to register for a Ph.D and discuss my Ph.D project with my supervisor, Dr Turner.

N. Songore

Project I

ASSESSMENT OF POTENTIAL DEVELOPMENT OF A VUNDU FISHERY ON LAKE KARIBA.

Objectives

1. To develop a vundu, *(Heterbranchus longifilis)* long-line fishery.

2. Improve market acceptance of the catfish.

Work Done

Experimental fishing as well as market trials as outlined in the 1993 annual report have been completed and a report is being prepared.

OTHER ACTIVITIES

Hydroacoustics

In addition to participation in regular hydroacoustics survey on Lake Kariba, the writer was involved in undertaking two hydroacoustic survey of the Lake Cahora Bassa. More details about these surveys are covered in Mr Mhlanga's annual report.

Law enforcement

During the course of the year, the writer was involved in co-ordinating law enforcement activities. The activities included a joint patrol with our Zambian counterparts. This patrol included Customs and Immigration people from both sides of the lake, Zambia and Zimbabwe Police forces as well as other government officials from both sides of the lake. The objective of was to educate people particularly fishermen on the dangers of illegal boarder crossings as well as selling of fish before it is landed. Fish poaching as well as sales of fish before its landed has reached an alarming extend such that there is an estimated 50% under reporting of catches. Other activity carried out was spot checking of fishing vessels as there were reports of pirate fishing vessels.

Adoption of the CAMPFIRE approach in the Inshore Fisheries Management

The writer has been involved in the formation of a Gillnet Fisherman's Association. The objective of the formation of the association is to devolve management of the inshore fishery from the government to the fishermen. Training courses, in preparation for the devolvement of powers, have been run for the fishermen. Under this programme fishermen are to be allocated specific fishing grounds and they will leases for these. Future work in this activity

involves intensive fish sampling in some of the inshore fishing grounds to justify the demarcation of the fishing grounds

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